AMENDMENTS TO THE CLAIMS

Claims 2, 16, 19, 30, 35, 38, and 39 are amended herein. Claims 9, 12, 27-29, 47-49, and 58 are withdrawn without prejudice or disclaimer. Claim 34 is canceled without prejudice or disclaimer. New claims 59-66 are added.

1. (Previously Presented) A laser, comprising:

a cavity which repeatedly passes light energy along a cavity axis;

a length of multi-mode optical fiber having a cladding and doped with a gain medium and positioned along said cavity axis;

a pump coupled to said cladding for exciting said gain medium; and

an optical guide positioned on said cavity axis which confines the light amplified by said multi-mode optical fiber to preferentially the fundamental mode of said multi-mode optical fiber.

2. (Currently Amended) A laser as defined in Claim 1 additionally comprising a mode locking mechanism positioned on said cavity axis, wherein said mode locking mechanism comprises a passive mode locking element.

3. (Previously Presented) A laser as defined in Claim 2 wherein said passive mode locking element comprises a saturable absorber.

4. (Previously Presented) A laser as defined in Claim 3 wherein said saturable absorber comprises InGaAsP.

5. (Previously Presented) A laser as defined in Claim 3 additionally comprising a power limiter for protecting said saturable absorber.

6. (Previously Presented) A laser as defined in Claim 5 wherein said power limiter comprises a two photon absorber.

7. (Previously Presented) A laser as defined in Claim 1 wherein said optical guide comprises a single-mode mode-filter fiber on said cavity axis.

8. (Previously Presented) A laser as defined in Claim 7 wherein said single-mode mode-filter fiber is fusion spliced onto one end of said multi-mode optical fiber.

9. (Withdrawn) A laser as defined in Claim 8 wherein said multi-mode fiber is tapered at said fusion splice.

10. (Previously Presented) A laser as defined in Claim 8 wherein said single-mode mode-filter fiber is tapered at said fusion splice.

11. (Previously Presented) A laser as defined in Claim 8 wherein both said single-mode mode-filter fiber and said multi-mode fiber are tapered at said fusion splice.

12. (Withdrawn) A laser as defined in Claim 1 wherein said pump is coupled to said multi-mode fiber along said cavity axis.

13. (Previously Presented) A laser as defined in Claim 1 wherein said pump is coupled to the side of said multi-mode fiber.

14. (Previously Presented) A laser as defined in Claim 13 additionally comprising an optical coupler for coupling said pump to said multi-mode fiber.

15. (Previously Presented) A laser as defined in Claim 13 additionally comprising a v-groove on said multi-mode optical fiber for coupling said pump to said multi-mode fiber.

16. (Currently Amended) A laser as defined in Claim 1 additionally comprising a polarization beam splitter for outputting ~~said ultra-short optical pulses~~ light from said laser.

17. (Previously Presented) A laser as defined in Claim 1 wherein said cavity comprises a pair of reflectors at its opposite ends.

18. (Previously Presented) A laser as defined in Claim 17 wherein one of said pair of reflectors is partially reflecting and provides the output for said cavity.

19. (Currently Amended) A laser as defined in Claim 17 additionally comprising a mode locking mechanism positioned on said cavity axis, wherein said mode locking mechanism comprises a saturable absorber, and wherein one of said reflectors is formed on a surface of said saturable absorber.

20. (Previously Presented) A laser as defined in Claim 19 wherein said mode locking mechanism additionally comprises a power limiter for protecting said saturable absorber, and wherein said saturable absorber is formed on a surface of said power limiter opposite said one of said reflectors.

21. (Previously Presented) A laser as defined in Claim 20 wherein said power limiter comprises a two-photon absorber.

22. (Previously Presented) A laser as defined in Claim 1 additionally comprising a linear phase drift compensator on said cavity axis.

23. (Previously Presented) A laser as defined in Claim 22 wherein said linear phase drift compensator comprises a Faraday rotator.

24. (Previously Presented) A laser as defined in Claim 23 wherein said linear phase drift compensator comprises a pair of Faraday rotators.

25. (Previously Presented) A laser as defined in Claim 22 additionally comprising a linear polarization transformer on said cavity axis.

26. (Previously Presented) A laser as defined in Claim 25 wherein said linear polarization transformer comprises a wave plate.

27. (Withdrawn) A laser as defined in Claim 1 wherein said mode locking mechanism comprises an active mode locking element.

28. (Withdrawn) A laser as defined in Claim 27 wherein said active mode locking element comprises an optical amplitude modulator.

29. (Withdrawn) A laser as defined in Claim 27 wherein said active mode locking element comprises an optical frequency modulator.

30. (Currently Amended) A laser as defined in Claim 1 configured to generate ultra-short optical pulses, wherein said ultra-short optical pulses preferentially in the fundamental mode of said multi-mode optical fiber have a pulse width below 500 psec.

31. (Previously Presented) A laser as defined in Claim 1 additionally comprising an environmental stabilizer on said cavity axis to assure that said cavity remains environmentally stable.

32. (Previously Presented) A laser as defined in Claim 31 wherein said environmental stabilizer comprises a Faraday rotator.

33. (Previously Presented) A laser as defined in Claim 32 wherein said environmental stabilizer comprises a pair of Faraday rotators.

34. (Canceled)

35. (Currently Amended) A laser as defined in Claim 34 wherein said amplifying medium is concentrated centrally within a fraction of [[the]] a core diameter of said optical fiber of said optical guide.

36. (Previously Presented) A laser as defined in Claim 1 wherein said optical guide comprises a single-mode optical fiber on said cavity axis.

37. (Previously Presented) A laser as defined in Claim 1 wherein said optical guide comprises a mode-filter on said cavity axis.

38. (Currently Amended) A laser as defined in Claim 37 wherein said mode filter ~~excites~~ confines said light energy substantially to the fundamental mode of said multi-mode fiber.

39. (Currently Amended) A laser as defined in Claim 38 wherein said mode filter ~~excites~~ confines said light energy substantially to the fundamental mode of said multi-mode fiber with an efficiency of at least 90%.

40. (Previously Presented) A laser as defined in Claim 1 wherein said cavity additionally comprises a positive dispersion element.

41. (Previously Presented) A laser as defined in Claim 40 wherein said positive dispersion element comprises a length of single-mode positive dispersion fiber positioned along said cavity axis.

42. (Previously Presented) A laser as defined in Claim 41 additionally comprising an output coupler for limiting the light energy at said single-mode positive dispersion fiber to less than 10% of the peak power in said cavity.

43. (Previously Presented) A laser as defined in Claim 42 additionally comprising a frequency converter for compressing pulses generated by said cavity.

44. (Previously Presented) A laser as defined in Claim 43 wherein said frequency converter comprises a frequency doubler.

45. (Previously Presented) A laser as defined in Claim 44 wherein said frequency doubler comprises chirped periodically poled $LiNbO_3$.

46. (Previously Presented) A laser as defined in Claim 1 wherein said multi-mode fiber includes a core, and wherein said gain medium in said multi-mode optical fiber is concentrated centrally within the core of said multi-mode fiber.

47. (Withdrawn) A laser as defined in Claim 1 wherein said multi-mode optical fiber is polarization-maintaining.

48. (Withdrawn) A laser as defined in Claim 47 wherein said polarization-maintaining multi-mode fiber has an elliptical core.

49. (Withdrawn) A laser as defined in Claim 47 wherein said polarization maintaining multi-mode fiber comprises stress-producing regions.

50. (Previously Presented) A laser as defined in Claim 1 wherein said cavity additionally comprises a fiber grating written onto said multi-mode fiber, said grating primarily reflecting the fundamental mode of said multi-mode fiber.

51 – 54. (Canceled)

55. (Previously Presented) A method, comprising:

circulating light energy within a laser cavity;

amplifying said light energy within said laser cavity in a bent multi-mode fiber; and

confining said light energy within said laser cavity substantially to the fundamental mode of said multi-mode fiber.

56. (Previously Presented) A method as defined in Claim 55 additionally comprising mode locking said light energy.

57. (Previously Presented) A method as defined in Claim 55 wherein said confining comprises mode filtering said light energy.

58. (Withdrawn) A mode-locked laser, comprising:

A multi-mode optical fiber doped with gain material for amplifying optical energy;

a source for pumping said optical fiber; and

a tapered length of multi-mode fiber for confining the optical energy amplified by said multi-mode optical fiber to substantially the fundamental mode of said multi-mode optical fiber.

59. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber is bent.

60. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber is coiled.

61. (New) A laser as defined in Claim 60, wherein said coiled length has a diameter of about 5 cm or smaller.

62. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber has a V-value greater than about 2.41.

63. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber has a V-value greater than about 2.5.

64. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber is capable of supporting a number of propagating modes between 3 and 3000.

65. (New) A laser as defined in Claim 1, wherein said length of multi-mode optical fiber is capable of supporting a number of propagating modes between 3 and 1000.

66. (New) A method as defined in Claim 55, wherein said bent multi-mode fiber comprises a coil of multi-mode fiber.